TABLE OF CONTENTS

Table of Contents	Page 1
Notes	Page 2
Purpose, Websites for Manuals	Page 3
CADD Overview at Caltrans	Page 4
Electronic Data/ Project Delivery Process	Page 5
Transition from Metric to English	Page 6
CADD Standards for English	Page 7
Scales	Page 7
Profile Sheets, Cross Sections	Page 8
Contour Intervals, Miscellaneous	Page 9
Text Sizes	Page 10
Seed Files, Working Units	Page 11
U.S. Survey Foot	Page 12
Primer – Exact Conversion Factors	Page 12 & 13
CADD Standards	
Drafting Conventions	Page 14 - 17
Leveling	Page 18 & 19
Color	Page 20
Line Weights	Page 21
Line Codes, Custom Line Styles	Page 22
Resource Files	Page 23
File Naming Convention	Page 24 – 28
Master Files	
Master Topographic & Master Design	Page 29
Base Maps	Page 29 & 30
Master Clip & Master Plan Sheet	Page 30 & 31
Contract Plan Sheet	Page 31
PS&E to As-Builts	
PS&E Submittal	Page 32
File Formats	Page 32 & 33
Views, Reference Files	Page 33
Plotting	Page 34
Contract Document Bid Set	Page 34 & 35
Draft Contract Ready	Page 35
As-Awarded, AADD Projects	Page 36
Files to Surveys and Construction	Page 37
Contract Change Orders	Page 37
As-Builts (Roadway Plans)	Page 38
Consultant Prepared Projects	Page 39
Caltrans Contact Names and Additional Caltrans Websites	Page 40

Notes

Purpose of EZ Guide

This "**EZ Guide"** is intended to give the reader an overall view of the Caltrans project delivery process in one small, condensed manual. The purpose for the EZ Guide is to identify the essential standards, conventions and work flow processes Caltrans utilizes in developing roadway design projects.

The information contained herein should be used as a quick reference to assist in designing a project and is in no way a replacement for the Plans Preparation Manual or the CADD Users Manual.

This document will help serve project, design and oversight engineers within Caltrans and our external partners, by explaining the need for consistency, Caltrans conventions and uniformity of CADD standards. If consistency and standardization are utilized from the inception of a project, effective and efficient use of electronic files will be achieved allowing time to focus on "**quality design**."

We hope your use of the EZ Guide will help facilitate, streamline and reduce delineation time and the handling of electronic files in the preparation of your project for Plans Specifications and Estimates (PS&E) Submittal.

Websites for Manuals

(Which the EZ Guide is based on)

Plans Preparation Manual:

http://www.dot.ca.gov/hq/esc/oe/project_plans/drafting/dpmanual.pdf

CADD Users Manual:

http://www.dot.ca.gov/hq/oppd/cadd/usta/caddman/default.htm

CADD Overview at Caltrans

Computer Aided Drafting and Design (CADD) has been used by Caltrans for more than 20 years. CADD is an integral part of the project delivery process, from project initiation through completion of the as-built plans.

CAiCE is currently the standard roadway software. In March 2006, InRoads was announced as the new Caltrans roadway software. The statewide deployment of InRoads is tentatively scheduled for Summer 2007. As a general rule, existing projects that have been designed with CAiCE will not be required to convert the CAiCE design files to InRoads design files for submittal to Surveys or Construction.

MicroStation is the standard drafting software for Caltrans. In November 2005, HQ CADD released Phase-1 of the Caltrans MicroStation V8 version. Phase-1 continues the process of only creating, utilizing and submitting version 7-file format DGN files (MicroStation J) to minimize backward compatibility issues. **Do not convert** existing version 7 files to version 8 files. CADD standards listed in the CADD Users Manual will not change during Phase-1. Changes to the CADD standards may occur during Phase-2 after all districts and functional units have come to a consensus on any **necessary** changes.

The current Caltrans official plotting solution is Interplot. Contract plans submitted to Division of Engineering Services – Office Engineer (DES-OE) as part of the Plans, Specifications and Estimate (PS&E) submittal package, must have an individual Interplot parameters file called an iparm (.i) for each MicroStation design file (DGN). Each DGN file contains just one individual plan sheet, with no reference files attached. Each contract plan sheet is a stand-alone legal document when it is part of the awarded contract documents. The submittal of models representing the entire limits of a project and containing individual sheet files are not accepted for PS&E submittals.

Electronic Data and the Project Delivery Process

Electronic data is utilized throughout the Project Delivery Process from the inception of a Project Initiation Document (PID) such as a Project Study Report (PSR) or Project Report (PR) to the completion of the as-built plans. Information used for an advance planning study, environmental document or corridor study may not be appropriate or accurate enough for the final design of a project. For guidance on reports, requests and submittals needed for developing and completing a project, see Chapter 14 of the Project Development Procedures Manual.

Before requesting surveys and mapping or acquiring existing data (vector or raster), decide on who will need to utilize or receive the information and what really needs to be included in the final product(s). When developing a project for PS&E, keep in mind what electronic files Construction or Surveys will need to build the project, including the completion of the as-built plans.

An informal Project Assessment meeting (sometimes called a Scoping meeting) early in the project delivery process will help identify the functional units involved in the project and the functional units needs to deliver their portion of the project. A Project Assessment meeting will also assist the engineer in determining the extent of electronic data (i.e. mapping or surveys) needed and the accuracy required. Early identification of each functional units electronic data needs and what they will be required to deliver will allow for more effective and efficient sharing of the project's electronic files.

One important item commonly overlooked on many projects is the early face-to-face field meeting onsite at the project location between the Project Engineer and the functional units such as Construction, Maintenance, Right of Way, Surveys, Hydraulics and Environmental. A face-to-face meeting prior to any constructibility reviews will promote teamwork, the sharing of critical project decisions and will minimize last minute changes and surprises. Knowing what the final deliverables (products) are and who will receive them, early in the design process, will minimize duplication of work and contribute to the on-time delivery of a **quality project**.

Transition from Metric to U.S. Customary Units

Caltrans has made the decision to develop and submit all projects in U.S. Customary Units (English). All projects initiated after March 1, 2005 and which will PS&E after March 1, 2007 must use U.S. Customary units. An exception may be required if a Metric project is submitted after March 1, 2007. Contact the Headquarters Division of Design on details for obtaining an exception. For the complete "Caltrans Metric to U.S. Customary Units Transition Plan" see the following website:

http://www.dot.ca.gov/hq/oppd/metric/metricpg.htm

The above website has also posted project related guidance for use during the transition. It includes:

- Interim Highway Design Guidance
- Interim Drafting and CADD Guidance for U.S. Customary Units (English)
- Interim Guidelines for Surveys/Right of Way Engineering/Photogrammetry
- U.S. Customary Units (English) Primer

U.S. Customary Unit based projects submitted before March 1, 2007 may require an exception pending the conversion of Caltrans Manuals and Guidance Documents to U.S. Customary Units that assists in the construction of a project. Release of the U.S. Customary Units versions of Caltrans Manuals and Guidance Documents is scheduled for August 31, 2006.

The U.S. Customary Unit version of the Caltrans Standard Plans, Standard Specifications and Special Provisions are scheduled for release by May 1, 2006. For questions concerning these manuals or documents, contact the Division of Engineering Services - Office Engineer (DES-OE).

CADD Standards for U.S. Customary Units (English)

Plan Sheet stationing shall be based on 100-feet per station with full annotation at 500-foot stations (multiple of 5). Annotation at 100-foot stations is a single digit number (the ones column). Station annotation shall not include plus stations (i.e. +00).

Example of stationing:

…… 9, 260, 1, 2, 3, 4, 265, 6, 7, 8, 9, 270, 1, ……

Stationing for Preliminary Drawings shall also be based on 100-feet per station and with full annotation at 500-foot stations for both 1" = 200' and 1" = 400'. The 100-foot stations do not need to be annotated.

Stationing for identifying begin and end limits regarding items of work and offsets shall be shown to the hundredth of a foot.

The typical length of a station tick mark (in a MicroStation design file) is 2.8' at 1" = 20', 7.0' at 1" = 50' and 14.0' at 1" = 100'. Station tick marks are centered on the alignment line. Annotation is placed below the alignment line.

Scales

		English
Plan Sheets:		
	(Base Scale)	1" = 20'
		1" = 50'
		1" = 100'
Preliminary Drawings:		
		1" = 200'
		1" = 400'

Profile Sheets

Vertical to horizontal scale ratios producing profile grade line plots steeper than 1:1 should be avoided because it overly distorts the actual field conditions. Scale ratio of Horizontal to Vertical (Horiz/Vert) = 10 is most commonly used.

Type of Conditions	English	
	Horizontal	Vertical
Rural sections in hilly or mountainous terrain	1" = 100'	1" = 10'
Rural or Urban with gentle rolling terrain	1" = 50'	1" = 5'
Rural or Urban with level terrain	1" = 20'	1" = 2'

Earthwork Cross-Section Plotting Scales

Rural	1" = 10'
Urban	1" = 5'

Cross-section intervals shall not be greater than 50 feet. More frequent intervals should be provided when changing roadway conditions aren't adequately shown using 50-foot intervals or when the profile is less than the minimum grade of 0.3%. Use 25 foot intervals on curves with a radius equal to or less than 1000 feet.

Include a cross-section for all roadway tapers, roadway pullouts, angle point locations, begin/end curves, begin/end high/low super, etc.

Maintain the same scale for all cross-sections in one alignment. The horizontal and vertical scales should be the same for ease of determining area.

Cross-sections are not part of the contract plans but are submitted as supplemental information to the contract documents and are available at each district office. Cross-sections **must** be made available if they were created during the designing of a project.

Contour Intervals

For U.S. customary units, the index contour line will be every fifth contour and will be a heavier weight than the intermediate contour lines.

In very steep terrain (at any scale), the intermediate contours may be eliminated if the contour lines are so close together affecting the readability of the mapping or plans.

English		
	Contours	
Plotting Scale	Index	Intermediate
1” = 20’	5 ft	1 ft
1” = 50’	10 ft	2 ft
1” = 100’	20 ft	4 ft
1” = 200’	50 ft	10 ft
1” = 400’	100 ft	20 ft

Miscellaneous

- Pavement cross slope and superelevation shall continue to be shown as percent.
- Angular measurement will retain the Degree-Minute-Second convention.
- Dual Units shall not be used on Contract Plans. All survey information will be expressed in English units.
- Side slopes shall be expressed in a non-dimensional ratio. The horizontal component shall always be shown first and then the vertical component (X:Y). When a side slope becomes steeper than 1:1, the horizontal component shall be shown as a fraction (3/4:1).

Text sizes for Highway Projects in English

DESCRIPTION	SIZE *	FONT	WT
Title Project Description	TX = 14.5	43	0
Name and ID Code of Individual Plan Sheets, (does not apply to the Title Sheet).	TX = 14.5 **	43	0
Titles for Quantity Tables and Detail Drawings.	TX = 12	43	0
Country and State boundary.	TX = 11	43	0
City Names on the Title Sheet Strip Map.	TX = 10	43	0
Begin and End Work on Title Sheet. Titles for Informational Tables.	TX = 10	3	2
Subtitles for Tables and Detail Drawings. Route and Route No. Headings in Quantity of Summary.	TH = 8.75 TW = 8.75 ***	3	2
River Names (Water Ways).	TX = 7	3 ****	1
Majority of Text, (including text with drawings, tables and dimensioning).	TX = 7	3	1
Restricted Space for Placement of Text.	TH = 7 TW = 6	3	0
Photogrammetric Mapping Text.	TX = 6	2	1

***** TX = represents height (TH) and width (TW) in **feet** for Caltrans standard 1" = 50' drawings.

****** Adjustable if necessary (TX = 12 minimum).

******* Reduce text width (TW = 7 minimum), if needed for restricted space.

******** Use slant angle of 25 degrees

Text sizes for 1" = 20' and 1" = 100' see CADD Users Manual (English).

Seed Files

A seed file should be considered as a template. When a new file is created, a seed file is necessary to define the type of design file desired, 2d or 3d, English or Metric. The seed file also sets the default settings and defines the working units.

The HQ CADD MicroStation Support Unit has issued English seed files. Because of the size of an English design plane in the MicroStation environment (before the version 8 file format), there are 48 geographical seed files needed to cover all of California. These seed files are based on the California Coordinate System (CCS) and are available in 2d or 3d. There are also 2 non-geographical seed files available for plan sheets like the Title, Typical Cross Sections, Details, Quantities, etc. All staff (Caltrans or consultants) must use these new seed files.

For details on the 48 English design planes, see the CADD Users Manual (English).

Working Units

There is only **ONE** standard working unit in Roadway Development and Plan Sheet Construction for English projects whether using MicroStation J or MicroStation V8.

Master Unit = feet (FT)
Sub Unit = tenths (TN)

Resolution in MicroStation J

Sub Units (SU)……..**10** tenths per feet
Positional Units (PU)……**1000** Positional units per tenths
Working Area…….**429,496** feet square

Resolution in MicroStation V8

The Resolution **must** be set to **10,000**.

All Caltrans seed files have the same working area (design plane size) just different coordinates (within the CCS) for the Project Setup (center of any design plane) and Global Origin (lower left corner of any design plane).

U.S. Survey Foot

In 1893, the U.S. foot was legally defined as 1200/3937 meters. In 1959, a refinement was made to bring the foot (International) into agreement with the definition used in other countries (i.e. 0.3048 meters.) But at the same time, it was decided that any data in feet derived from and published as a result of geodetic surveys within the U.S. would remain with the old standard, which is named the U.S. Survey Foot. The new length is shorter by exactly two parts in a million. (*Reference: Federal Standard 376B, January 27, 1993.*) The California Public Resources Code Section 8810 is the legal basis for using the U.S. Survey Foot in California for state plane coordinates.

Exact Conversion Factors

Length

Metric value	Multiply by	Exact U.S. Survey Foot Value
meter	3937/1200	foot (ft)
meter	3937/3600	yard (yd)
millimeter	3937/100,000	inch (in)
millimeter	3937/1,200,000	foot (ft)
kilometer	39370/12	foot (ft)
kilometer	3937/6336	mile (mi)

Example

A typical “Easting” in a Metric state plane coordinate zone is 2,000,000.00, which contains 9 significant digits.

U.S. Survey foot: 2,000,000.00 meters **X** (3937/1200) ft/m
= 6,561,666.67 feet

International foot: 2,000,000.00 meters **X (**1/0.3048) ft/m
= 6,561,679.79 feet

Difference is -13.12 feet.

Area

Metric value	Multiply by	Exact U.S. Survey Foot Value
square millimeter	$(3937/100{,}000)^2$	square inch
square millimeter	$(3937/1{,}200{,}000)^2$	square foot
square meter	$(3937/1200)^2$	square foot (ft^2)
square meter	$(3937/3600)^2$	square yard (yd^2)
square meter	$\frac{(3937/1200)^2}{43{,}560}$	acre *
square kilometer	$(3937/6336)^2$	square mile (mi^2)
square kilometer	$\frac{(39370/12)^2}{43{,}560}$	acre
hectare	$\frac{(3937/12)^2}{43{,}560}$	acre
hectare	$\frac{(3937/12)^2}{43{,}560(640)}$	square mile (mi^2) **

* acre = 43,560 square feet
** square mile = 640 acres

NOTE:
Most conversion calculators or programs use the International Foot definition of "1 foot = 0.3048 meters." The core MicroStation release from Bentley is defaulted to the International Foot. **With the Caltrans customization of MicroStation, the default has been set to U.S. Survey Foot (1200/3937)**.

Soft Convert: is an exact restating of a Metric unit of measurement in U.S. Customary Unit terms (i.e. area).

Hard Convert: is a statement of a previously used dimension rounded to a convenient, U.S. Customary Unit (i.e. lane width).

Caltrans Drafting Conventions

(Good Drafting Practices)

Good drafting gives a well-engineered project the look and feel of a quality product. It can enhance and clarify the readability of the contract plans. A perfectly engineered project is only perfect if it can be easily read and understood by the bidders, winning contractor and the construction inspector. While developing the project, the designer must always keep in mind the people who will read and interpret the plans (the plans are not for the designer or spec-engineer.)

A quality project can be defined as a "complete set of contract plans that clearly identifies all items of work that a competent contractor can easily interpret and build."

Simplicity and consistency are two of the important aspects of good drafting practices. Rules/guidelines for improving drafting practices that will enhance and clarify a project advertised by Caltrans include such things as:

- Eliminate extraneous information NOT directly related to that specific plan sheet. *Too often plan sheets are cluttered with excess topography causing important proposed design features to be overshadowed and leaving no space for pertinent related callouts identifying the items of work.*

- Background topography should not generally be shown outside the Right of Way (R/W) unless the design of the project (or specific sheet) requires it. *Information shown outside of the R/W can infer that work will be necessary outside the R/W when that is not the case. Just because the information exists in the base mapping of a project, doesn't mean it should be shown on every plan sheet.*

- Items of work identified on plan sheets must be called out (labeled) exactly the same as it appears in the quantity tables, engineer's estimate and special provisions.

- Quantities should be easy to identify, calculate and locate for all items of work. Plus stations are used to identify the "begin and end" of an item of work. All plan sheets shall show alignment lines so offset distances can be identified by it's known reference. Minor projects, designed using only Post Miles (PM) in place of stationing, shall identify locations to the tenth of a Post Mile.

- The plotting scale shown on all contract plan sheets is for convenience purposes only. There are only three acceptable scales for plan or profile sheets:
  1" = 20', 1" = 50' and 1" = 100'
  Sheets such as typical cross section and detail sheets shall be labeled with "No Scale."

- Expecting a bidder or contractor to scale from a hard copy print of any contract plan sheet to determine a quantity **SHALL NEVER** be a requirement. All items of work shall be clearly identified so quantities can be determined from the labeling and dimensioning on plan, profile or detail sheets. How quantities are identified and labeled in a quantity table shall be consistent with how they are identified and labeled on the plan, profile or detail sheet.

- If the quantity for the same item of work is shown on more than one quantity table, the sub-totals from each quantity table plus a grand total must be shown on the quantity table most logically associated with that item of work.

- Line weights, line styles and graphical representations of features must conform to the CADD Users Manual, Plans Preparation Manual and the Standard Plans.

- Abbreviations, Symbols and Symbology must conform to the Standard Plans A10A through A10D, H1 and H2 and ES-1A through ES-1C.

- Text size must conform to the CADD Users Manual. Placement of text should be consistent and legible throughout the project. When looking at a plan sheet, the alignment of text should easily be read from left to right or bottom to top.

- Text should be placed above or below the line work if leaders and arrowheads are not used. Placement of text should not break line work or shapes.

- Be consistent with the use of leaders and arrowheads.

- Match lines should be perpendicular to the alignment line and located halfway between station tick marks (i.e. +50).

- Placement of symbols, notes or disclaimer information should be consistently located at the same location on plan sheets within a project and at the same location for all projects.

- Dimensions in feet and inches shall be shown with a single quote mark for feet and a double quote mark for inches.

- All projects must have at least two sheets (title sheet and one other showing proposed work.) The layouts are the base plan sheets and all plan sheet information can be shown on them. If the layouts become too crowded or cluttered, other plan sheets should be used to clearly show the proposed work (i.e. drainage, utilities, signing, striping, etc).

- The fewer and simpler the sheets, the more clear, concise and understandable the final plans will be.

- Some projects do not need layouts to show the proposed work. If the detail and quantity sheets (along with the special provisions) can clearly and concisely show and explain the proposed work, then layouts (or any other plan sheets) may not be necessary.

- Group similar or inter-related items of work on the same plan sheets (i.e. signing and striping.) Avoid one item of work on one type of plan sheet if it can easily be combined on another similar type plan sheet (unless too crowded or cluttered).

- Level Symbology is **NOT** a substitute for adhering to the Caltrans standards. Level Symbology re-defines attributes (color, style and weight) of elements on selected levels for clarity of viewing a design file in the monitor.

Additional Drafting Practices

Leveling

MicroStation has 63 levels available to use in each design file. Below is a list of those levels showing level name and number and color name and number. Levels 2-9, & 11 will dropout when plotted using Caltrans pen tables with Interplot.

Level name and number	Color name and number
#1-Control	#5 – violet
#2–Exist Manmade Features	#4 - yellow
#3–Exist Roadway Features	#4 – yellow
#4-Exist Vegetation & Natural Features	#2 – green
#5-Exist Utilities & Utility Facilities	#6 – orange
#6-Exist Hydrographic Features	#1 – blue
#7-Relief Features – Contours	#7 – brown
#8-Spot Elevations & Contour Annotations	#7 – brown
#9-Profile Grid	#3 – red
#10-Border Sheets	#0 – white
#11-Break Line, Terrain Features & Grid	#0 – white
#12-Coordinate Grid Ticks & Control Data	#5 – violet
#13-Ramp, Over/Under Crossing Alignment	#0 – white
#14-Ramp, Over/Under Crossing Annotation	#0 – white
#15-Mainline Alignment Data	#0 – white
#16-Mainline Alignment Annotation	#0 – white
#17-Frontage Road Alignment Data	#0 – white
#18-Frontage Road Alignment Annotation	#0 – white
#19- Undefined	
#20-Pavement Edges	#0 – white
#21-Curbs, Gutters, Dikes & Overside Drains	#0 – white
#22-Miscellaneous Construction Features	#0 – white
#23-Layout Notes	#0 – white
#24-Obliteration, Resurfacing & Cold Planing	#3 – red
#25-Temporary Alignments, Bike Paths	#3 – red
#26- Undefined	
#27- Undefined	
#28- Undefined	
#29-Exist Irrigation – includes Annotation	#7 – brown
#30-Cut and Fill Data	#3 – red
#31-Exist Right of Way Boundaries	#6 – orange
#32-New Right of Way, Fences & ESA’s	#6 – orange

Level name and number	Color name and number
#33-Right of Way Text & Annotation	#6 – orange
#34-Temporary Water Pollution Control	#6 - orange
#35-Permanent Erosion Control	#6 - orange
#36-Drainage	#1 – blue
#37-Drainage Annotation	#1 – blue
#38-Sanitary Sewer	#5 – violet
#39-Sanitary Sewer Annotation	#5 – violet
#40-New Utilities – includes Annotation	#4 – yellow
#41-Contour Grading	#5 – violet
#42-Pavement Elevations	#0 – white
#43-Pavement Markers & Striping	#3 – red
#44-Pavement Markers & Striping Annotation	#3 – red
#45-Signing	#3 – red
#46-Construction Area Signing	#3 – red
#47-Electrical	#0 – white
#48-Electrical Annotation	#4 – yellow
#49-Planting and Landscaping	#2 – green
#50-New Irrigation – includes Annotation	#1 – blue
#51-Stage 1 Construction	#3 – red
#52-Stage 1 Construction Annotation	#3 – red
#53-Stage 2 Construction	#3 – red
#54-Stage 2 Construction Annotation	#3 – red
#55-Stage 3 Construction	#3 – red
#56-Stage 3 Construction Annotation	#3 – red
#57- Undefined	
#58-Sound Walls & Retaining Walls	#0 – white
#59-Sound & Retaining Walls Annotation	#0 – white
#60-Non-geographical Drawing Data	#0 – white
#61-Headquarter Changes	#4 – yellow
#62-As-Built Changes	#3 – red
#63-Engineer Seal and Signature	#0 - white

Following the Caltrans leveling convention from the inception of a project is the most efficient way of handling and sharing electronic information throughout the entire project delivery process.

Information not currently defined by the Caltrans leveling convention, can be placed on any undefined level (there are 5 undefined levels).

Certain levels can use multiple colors such as Level 5, 40 and 47.

Color

There are 8 colors (0 – 7) that are standard for Caltrans Roadway drawings. These 8 colors are duplicated and re-numbered **to reverse** how information is plotted as either dropout or non-dropout depending on the levels they are located on. Levels 2-9 and 11 are the Caltrans standard dropout levels. Levels 1, 10, and 12–63 are the Caltrans standard non-dropout levels.

Standard 8 Colors	Dropout color for Non-Dropout Levels	Non-Dropout color for Dropout Levels
Color #	Color #	Color #
0 (white)	85	101
1 (blue)	86	102
2 (green)	87	103
3 (red)	88	104
4 (yellow)	89	105
5 (violet)	90	106
6 (orange)	91	107
7 (brown)	92	108

Color 0 (RGB value = 255, 255, 255) will display as white when viewing the DGN file but will be black when plotted out. RGB = Red, Green and Blue.

Colors in the standard Caltrans Roadway color table (ctcolor.tbl) have been reserved for Right of Way Engineering and Surveys. Please refer to Section 2.8 of the CADD Users Manual.

Line Weights

Line quality is extremely important to the readability of the 11" x 17" plan sheet size used for final contract plan bid documents. Line widths or weights are varied to distinguish certain classes of features from others. The more basic outlining features are emphasized with heavier (wider) lines. Examples are alignment lines, base lines, construction layout lines, and the basic outline of objects. Medium weight lines are used for proposed construction and right of way. Light lines are used for existing topography, dimensioning, and other less important details.

Weight	Feature	Visibility of line
1	Object Lines	Dark, bold and sharp
0	Dimension Lines	Sharp, thin lines
0	Object Center Lines	Sharp, thin lines
1	Hidden Lines	Sharp, dashed lines
0	Station Callout Lines	Dark, sharp and thin lines
1	Right of Way	Dark, bold and sharp
4	Sheet Borders	Heavy, dark and sharp
3*	Alignment Lines for Main Route(s)	Dark, bold and sharp
2*	Alignment Lines for Ramps and Local Streets	Dark, bold and sharp
1	Stationing for all Alignment Lines	Dark, bold and sharp

* Using varying line weights allows the main route alignment to be shown more prominently than secondary alignment lines, which in turn, allows secondary alignment lines to be shown more prominently than the proposed construction lines (edge of pavement, edge of shoulder, median barriers, etc.). If the weight of an alignment line obscures or interferes with proposed construction lines, the weight of the alignment line may be reduced to provide greater clarity of the work to be performed.

Line Codes

Line codes depict a recognizable pattern used mainly to distinguish existing features or objects from proposed features on non-dropout levels. These ***Line Codes*** should not be confused with ***Custom Line Styles*** or ***Patterned Lines.*** There are ***(8)*** standard line codes built into the Bentley MicroStation Product and are fixed in size (spacing of dashed lines).

Line Code	Definition
0	Solid or Continuous line. Used for proposed objects (not Hidden) and Dimension lines.
1	A Dotted Line (used only for existing features)
2	Short Dashed Line
3	Long Dashed Line (used for depicting hidden details & existing non-structural features)
4	Dash-Dot
5	Medium Dashed Line
6	Dash-Dot-Dot (Existing Structural Features)
7	Long Dash-Short Dash (Object Centerlines)

Custom Line Styles

Custom Line Styles replace the need (in most circumstances) for *Linear Patterning*. *Custom Line-Styles* define specific elements graphically in a drawing file (guard railing, various utilities, etc.) To place and display *Custom Line Styles*, the individual workstation (computer) must have the resource file loaded on it. *Custom Line Styles* are not embedded in the design file, as is the case with cells. The resource file must be loaded on the workstation and available in order to draw or display *Custom Line Styles* within a design file. The **ONE** standard Caltrans line style resource file is "**ctlstyle.rsc**" for both Metric and English. The scale factor for Custom Line Styles on Metric plan sheets remains the same as it has been.

Scale Factor for Custom Line Styles on **English** plan sheets:

1"=20' = **1.5748** 1"=50' = **3.937** 1"=100' = **7.874**

Caltrans Resource Files

Cell Libraries:

The standard Caltrans English Cell Library is: "**ctcellib.cel**".
The standard Caltrans Metric Cell Library is "**mtcellib.cel**".

The Caltrans Cell Library is made up of cells for 6 functional units, which are as follows:

Project Plans
Roadway Design
Landscape Architecture
Traffic Electrical
Surveys
Photogrammetry

Right of Way Engineering has two standard cell libraries:

RWEnglish.cel
RWMetric.cel

Resource Files:

The following resource files (.rsc) need to be loaded and configured for everyone working on PS&E projects:

"ctfont.rsc" (Caltrans standard fonts)
"ctlstyle.rsc" (Caltrans standard line styles)

Table Files:

The following table files need to be utilized for PS&E delivery:

ctcolor.tbl (Standard Caltrans Roadway Color Table)
fullbw.pen (Pen Table for PS&E Submittal)

File Naming Convention
Highway Construction Projects

The "File Name" is a unique identification for each drawing. This unique “File Name” allows for the search of a drawing by DISTRICT & EXPENDITURE AUTHORIZATION (EA) (also used as the contract number). For highway and landscape plans, the file name is 11 characters long, combining both alpha and numeric characters. The windows operating system is case-aware, not case-sensitive, but the preference is lower case lettering for the file names of all contract plan sheets.

The first character of the file name shall be the designation of the District where construction is to be performed. The designation for Districts 1 through 9 is the corresponding district number (one character only) where the project is located. The designation for District 10 is “a”, for District 11 is “b”, and for District 12 is “c”.

Characters 2 through 6 of the file name shall be the first five digits of the Expenditure Authorization (EA). Characters 7 & 8 of the file name shall be the Print Sequence Code, which are unique for each type of sheet used in a project. Characters 9 through 11 of the file name shall be the respective sheet numbers for each Print Sequence Code used in the project.

Example: (District 04 project) - file name for the first sheet of layouts: **412345ea001**

Where **4** = District where construction is located
12345 = First five numbers of EA
ea = Print Sequence Code for layouts
001 = First sheet of the layouts

Example: (District 11 project) - file name for the 105th sheet of drainage profiles: **b12345ib105**

Where **b** = District where construction is located
12345 = First five numbers of EA
ib = Print Sequence Code for drainage profiles
105 = 105th sheet of drainage profiles

Sheet Type	Sheet ID	Print Sequence Code
Title	—	ab
Locations of Construction	LC	ba
Typical Cross Sections	X	ca
Key Map and Line Index	K	da
Aerial Identification	A	db
Layout	L	ea
Layout (*with Profile or with both profile & superelevation diagram shown)*	L	ea
Profile (*without superelevation diagram)*	P	fa
Profile & Superelevation Diagram	PS	fb
Superelevation Diagram	SE	fc
Construction Details	C	ga
Temporary Water Pollution Control Plan *(With or without details or quantities)*	WPC	gb
Temporary Water Pollution Control Details *(With or without quantities)*	WPCD	gc
Temporary Water Pollution Control Quantities	WPCQ	gd
Erosion Control Plan *(With or without details or quantities)*	EC	ge
Erosion Control Details *(With or without quantities)*	ECD	gf
Erosion Control Quantities	ECQ	gh
Contour Grading	G	ha
Drainage Plan	D	ia
Drainage Profiles	DP	ib
Drainage Details	DD	ic
Drainage Quantities	DQ	id
Edge Drain Plan	ED	ie
Sanitary Sewer Plan	SS	ja
Sanitary Sewer Profiles	SSP	jb
Sanitary Sewer Details	SSD	jc
Sanitary Sewer Quantities	SSQ	jd
Utility Plan *(With or without details or quantities)*	U	ka
Utility Details *(With or without quantities)*	UD	kb
Utility Quantities	UQ	kc
Construction Area Signs	CS	la
Transportation Management Plan *(With or without details or quantities)*	TM	lb
Transportation Management Details *(With or without quantities)*	TMD	lc
Transportation Management Quantities,	TMQ	ld

Sheet Type	Sheet ID	Print Sequence Code
Stage Construction *(With or without Traffic Handling Plan)* *(With or without Detour Plan)* *(With or without details or quantities)*	**SC**	**ma**
Stage Construction Details *(With or without quantities)*	**SCD**	**mb**
Stage Construction Quantities	**SCQ**	**mc**
Traffic Handling Plan *(When not included on SC sheet)* *(With or without details or quantities)*	**TH**	**md**
Traffic Handling Details *(With or without quantities)*	**THD**	**me**
Traffic Handling Quantities	**THQ**	**mf**
Detour Plan *(When not included on SC or TH sheet)* *(With or without quantities)*	**DE**	**mg**
Detour Quantities	**DEQ**	**mh**
Pavement Delineation Plan	**PD**	**na**
Pavement Delineation Details	**PDD**	**nb**
Pavement Delineation Quantities	**PDQ**	**nc**
Sign Plan	**S**	**oa**
Sign Details	**SD**	**ob**
Sign Quantities	**SQ**	**oc**
Summary of Quantities	**Q**	**pa**
Retaining Wall Plan (1st wall)	**R**	**qa**
Retaining Wall Typical Section (1st wall)	**R**	**qa**
Retaining Wall Details (1st wall)	**R**	**qa**
Retaining Wall Quantities (1st wall)	**R**	**qa**
Log of Test Boring (1st wall, possibly others)	**R**	**qa**
Retaining Wall Plan (2nd wall)	**R**	**qb**
Retaining Wall Typical Section (2nd wall)	**R**	**qb**
Retaining Wall Details (2nd wall)	**R**	**qb**
Retaining Wall Quantities (2nd wall)	**R**	**qb**
Log of Test Boring (2nd wall, if not with 1st wall)	**R**	**qb**

Print Sequence Code for all subsequent walls will be "qc" through "qz" (26 walls). The total quantities from all walls shall be shown on the Summary of Quantities sheets.

Depending on complexity of the wall, information can be placed on one sheet, or information can have its own sheet. But all sheets for each wall will have the same Sheet ID.
(All information pertaining to the 1st wall is to be shown before 2nd wall.

Sheet Type	Sheet ID	Print Sequence Code
Sound Wall Plan (1st wall)	**SW**	**ra**
Sound Wall Typical Section (1st wall)	**SW**	**ra**
Sound Wall Details (1st wall)	**SW**	**ra**
Sound Wall Quantities (1st wall)	**SW**	**ra**
Log of Test Boring (1st wall, possibly others)	**SW**	**ra**
Sound Wall Plan (2nd wall)	**SW**	**rb**
Sound Wall Typical Section (2nd wall)	**SW**	**rb**
Sound Wall Details (2nd wall)	**SW**	**rb**
Sound Wall Quantities (2nd wall)	**SW**	**rb**
Log of Test Boring (2nd wall, if not with 1st wall)	**SW**	**rb**

Print Sequence Code for all subsequent walls will be "rc" through "rz" (26 walls). The total quantities from all walls shall be shown on the Summary of Quantities sheets.

Depending on complexity of the wall, information can be placed on one sheet, or information can have its own sheet. But all sheets for each wall will have the same Sheet ID.
(All information pertaining to the 1st wall is to be shown before 2nd wall.

Roadside Rest Plan	**RSR**	**sa**
Plant List	**PL**	**te**
Plant Removal Plan	**PR**	**tf**
Roadside Clearing Plan	**RC**	**tg**
Maintain Existing Plants Plan	**MA**	**th**
Planting Plan	**PP**	**ti**
Irrigation Removal Plan	**IR**	**tk**
Irrigation Plan	**IP**	**tl**
Planting and Irrigation Plan	**PI**	**tm**
Landscape Details	**LD**	**tn**
Existing Irrigation Plan	**EI**	**tp**
Existing Utilities Plan	**EU**	**tq**
Electrical Service (Irrigation Plan)	**E**	**tt**
Booster Pump (Electrical)	**EE**	**tu**
Booster Pump (Mechanical Electrical)	**ME**	**tv**
Booster Pump (Mechanical)	**M**	**tw**
Signal, Lighting, and Electrical Systems Plan and Details	**E**	**ua**
Revised Standard Plan		**va**
New Standard Plan		**vb**

Highway Planting Projects

Sheet Type	Sheet ID	Print Sequence Code
Title		ta
Key Map	K	tb
Temporary Water Pollution Control Plan *(With or without details or quantities)*	WPC	tc
Temporary Water Pollution Control Details *(With or without quantities)*	WPCD	tc
Temporary Water Pollution Control Quantities	WPCQ	tc
Erosion Control Plan *(With or without details or quantities)*	EC	td
Erosion Control Details *(With or without quantities)*	ECD	td
Erosion Control Quantities	ECQ	td
Plant List	PL	te
Plant Removal Plan	PR	tf
Roadside Clearing Plan	RC	tg
Maintain Existing Plants Plan	MA	th
Planting Plan	PP	ti
Irrigation Removal Plan	IR	tk
Irrigation Plan	IP	tl
Planting and Irrigation Plan	PI	tm
Landscape Details	LD	tn
Irrigation Quantities	IQ	to
Existing Irrigation Plan	EI	tp
Existing Utilities Plan	EU	tq
Construction Area Signs	CS	tr
Traffic Handling Plan *(With or without details or quantities)*	TH	ts
Traffic Handling Details *(With or without quantities)*	THD	ts
Traffic Handling Quantities	THQ	ts
Electrical Service (Irrigation Plan)	E	tt
Booster Pump (Electrical)	EE	tu
Booster Pump (Mechanical Electrical)	ME	tv
Booster Pump (Mechanical)	M	tw

Master files

Master Topographic File

The Master Topographic file (also called the “bb” file) contains all data representing existing topographic features of the project such as; natural vegetation, roads, curbs, edge of road, fences, buildings, hydrographic features, drainage and irrigation structures, underground and above ground utilities and contours of the original terrain. The district and EA should be part of the name (i.e. A12345bb.dgn).

Master Design File

The Master Design file (also called the “aa” file) contains all proposed permanent design information for a project. The design file contains all the proposed work such as; curbs, new utilities, walls, guard railing, fences, alignment lines and right of way. The Master Design File may also contain information that needs to be shown on each type of plan sheet (but not just one type).

All coordinate geometry should be done in this design file. The Master Topographic file is either referenced to the Master Design file to serve as the base map (usually maintaining the “aa” name i.e. A12345aa.dgn) or they are merged into one DGN file.

Base Maps

A Base map serves as the basis for all plan sheets (i.e. layouts, drainage, utilities, pavement delineation, etc) that may be needed in a contract set of plans. The Project Engineer in the design squad handling the project usually develops the original/master base map. But **all** functional units involved in the project should have “read” access and utilize the original base map created by the design squad handling the project. The original base map should not be copied for the sake of duplicating it. Nor should any functional unit create their own base map. **Note**: *base maps should stay referenced as long as possible before being copied into the active file, thus changes made to the base map would automatically be reflected in all files referencing the base map.*

Depending on the size and complexity of a project, more than one base map may be necessary. For example: pavement delineation plan sheets are usually modified to show the proposed roadway design information (ETW, curbs, dikes and alignment line) as existing, since striping is one of the last items of work done on any project. Copying the original base map and modifying it for the pavement delineation plan sheets usually accomplishes this.

The staging of a project creates the need for a separate base map for each stage. Completed work from a previous stage **must** be shown as existing information (dropout) for the next stage of work.

If base maps were developed for any project, they should be kept by the district for possible re-use on future projects. The information contained in a base map should always be based on the California Coordinate System (CCS).

Through the years the naming of base maps has been left to the individuals creating them since they were seldom saved after the project was submitted for PS&E. With the current need and emphasis on saving the base maps for future use, the **district** and **EA** should be included in the name as shown below:

Original base map	A12345base.dgn
For PD plan sheets	A12345basen.dgn
Stage 1 plan sheets	A12345stage1.dgn
Stage 2 plan sheets	A12345stage2.dgn

For PD example above, the first letter (n) of the Print Sequence Code is used to identify the type of sheet the base map is for.

Master Clip Frame File

The Master Clip Frame file contains the clip frames that create the individual contract plans sheets. The Master Clip Frame file should be referenced to the Master Design file.

If different plotting scales are needed for various plan sheets, more than one Master Clip Frame file will be needed. A Master Clip Frame file should contain only the clip frames for one plotting scale.

Master Plan Sheet File

The Master Plan Sheet file contains the appropriate border sheet for each registered engineer that is responsible for signing one or more plan sheet(s). The Master Plan Sheet file contains the following information; registration information, signature of the Project Engineer, approval date, expenditure authorization code and charge unit, name or initials of engineers involved in the project and the District/Route/Post Mile.

The Master Plan Sheet file is referenced to the appropriate Contract Plan Sheet. The Master Plan Sheet file should never be placed in the Master Design file.

Contract Plan Sheet

The Contract Plan Sheet (active file) is composed of information that is unique to that particular plan sheet. The active file generally contains descriptions, labeling, notes or symbology that defines or quantifies the items of work for that particular plan sheet. Information that is generally found in the active file for a layout sheet may include; dimensioning, callouts, legend, notes, curve data information, plus stations, hatched regions and lane widths.

Each active file is contained in just one MicroStation design file (DGN). The Caltrans naming convention applies to each DGN that is part of the project.

The Master Topographic, Master Design (base map), Master Plan Sheet, and the Master Clip Frame are referenced to the active files during the development of the project. This allows a project, with various types of plan sheets, to easily be worked on at the same time while referencing the same base map. At PS&E submittal time, only the **necessary information** in the reference files is to be copied into the active file. Active files for PS&E submittal shall not have any reference files attached. Each plan sheet is a snap shot of the information needed for review by DES-Office Engineer and then finalized as contract bid documents.

PS&E Submittal

The plans portion of the PS&E submittal to DES-OE are electronic files consisting of a DGN & Iparm for each contract plan sheet. Use a PS&E CADD Submittal Form (refer to the Plans Preparation Manual). Include a Project Plans Review Checklist. Fill in all the information on the forms completely and accurately to process project in a timely manner. All electronic files must meet the requirements stated in the PS&E Directory Checklist and the Drafting Plan Review Checklist for the job to be considered "PS&E ready".

For questions about PS&E submittals, contact your district OE.

Standard Acceptable File Format at PS&E

Caltrans only accepts 100% electronic submittals. The standard file format for all submissions of Plans, Specifications & Estimate (PS&E) is a MicroStation ***design file*** or ***DGN.***

The following variations, with prior approval at approximately 60% completion, from Division of Engineering Services – Office Engineer, will also be acceptable for PS&E Submittal, under the specific circumstances listed below:

- ***(DGN)*** format files with imbedded or imported raster data (aerial photographs or digital pictures). Raster data should be limited to detail sheets that require enhancing or emphasizing of a detail or a unique location (i.e. toll plaza at the San Francisco/Oakland Bay Bridge) that the contractor might need to see. The need for imported raster data should be based on an engineering need, not for aesthetics or a location identification need. Contract plans should first and foremost be engineered plans not photogrammetric plans. Aerial photographs were designed for preliminary plans not final contract plans. If aerial mapping is needed for identifying specific locations, plan sheets have been established to handle the raster data. These sheets are called "Aerial Identification" and follow the "Key Map and Line Index" sheets. Raster data should not be used as background for other plan sheets such as layouts, drainage, utilities, pavement delineation, etc.

- ***(Tiff)*** or ***Tagged Information Format File*** acceptable where legacy plans (in most all cases this refers to Log of Test Boring sheets) is being considered for submission as part of a new CADD Submittal. This is a single, complete plan sheet with borders intact, submitted as a tiff raster image. The legacy sheet is to be scanned, sized (cropped), de-speckled and de-skewed before submittal. The preferred size of the finished Tiff plot is 22 inches x 34 inches and for special circumstances the maximum allowable size is 23 inches x 35 inches. These will be raster edited.

Non-Acceptable Formats

- **Hard Copy Originals**
- **Reference Files** (neither vector nor raster)
- **Cadd Generated Raster-** Any file that was created as a ***DGN*** file, but converted to raster for convenience or expediency, will not be accepted for PS&E Submittal.
- **Models**- (submittals must be 1 DGN file for each contract plan sheet.)
- **AutoCad Files-** files started with AutoCad (.dwg or .dxf) must be converted into a MicroStation file (DGN) under the direction of the engineer of record.

Views

The accepted number of views for PS&E submittal to DES-OE is only one full plan view displayed in window 1.

Reference Files

No reference files of any kind will be accepted with the PS&E Submittal. All information that is pertinent to any specific contract plan sheet needs to reside in just one specific DGN file. This helps convey the fact that all final contract plan sheets are “legal contract documents” and should not be changed because a change was made in a reference file (or model). However, the use of reference files is a very important tool during the course of developing and designing any project. References files should stay referenced until just before PS&E submittal, so any change made in a reference file will automatically be reflected in all files that have the reference file attached (not already copied in).

Plotting

The official Caltrans plotting application is “Interplot.”
For each DGN file submitted for PS&E, an Iplot parameters file-iparm (.i) needs to be created and submitted with the DGN for final PS&E Submittal:

1) Snap to “cut line” (lower left to the upper right) when defining the plot region. Snapping from lower left to upper right when creating the iparm may alleviate most view rotation issues. Plot size should equal exactly 34 inches x 22 inches.
2) All 63 levels are to be turned on. Make sure view contains only the appropriate information for each specific type of sheet. Too much information distracts from the real purpose of the sheet but pertinent information missing may lead to inaccurate cost estimates and bids.
3) Rotation. The plot view (not the design file), in reference to the monitor, needs to be zero degrees.
4) Use Pen Table “fullbw.pen” for PS&E Submittal.
5) Prior to PS&E, “halfbw.pen” may be used to create half-size review check prints.
6) One important reason that Caltrans uses a leveling convention is to properly show existing information. Solid (as well as dashed) lines on levels 2-9 and 11 will be plotted as dotted lines.
7) It is recommended that the iparms delivered with the PS&E submittal be created after the naming of all DGN files so the iparms will reflect the correct name for each DGN file (thus avoiding a plotting failure).
8) Construction elements are not plotted when using Interplot as Caltrans has configured it.

Contract Document Bid Set

A Contract Bid Document Set is made up of several items. The two most obvious are the plans and special provisions. These two parts **MUST** compliment each other.

When developing a set of contract plans, the Project Engineer must keep in mind the special provisions for each item of work. The Project Engineer should work closely (early in the design) with district Office Engineer so plans and special provisions are

coordinated and not developed independent of each other. Consideration of the special provisions is not a last minute thing. The contract plans **do not** stand by themselves. Contract plans and special provisions are a complete package deal and must compliment one another. If there is a discrepancy between the plans and the special provisions, **the special provisions take precedence** in any claim or disagreement between the contractor and construction.

Draft Contract Ready

After PS&E submittal by a district, DES-OE Project Plans Unit will send the district a "First Notice," acknowledging that the plans portion of the district's PS&E submittal has been received. It is recommended that the district keep the MicroStation files (DGNs) as submitted to DES-OE. There may be cases where the district will submit revised, replacement or additional plan sheets after the original PS&E submittal, and thus will receive another "First Notice."

Upon a complete review of the district PS&E submittal, DES-OE develops Draft Contract Comments (DCC). In reviewing the DCC, the district Project Engineer has his/her only opportunity to respond to any redline change before the printing of the PS&E contract advertising bid set. After the district reviews, discusses and agrees with the DCC, the District Responses (DR) is to be returned to DES-OE.

> **Note**: the Project Engineer may request a scanned copy of a particular redline plan sheet from the DES-OE Spec Engineer (SE) only if it is necessary to convey the redline plan change. Any change or correction after the DCC must be handled by an addendum.

The Draft Contract Ready (DCR) process finalizes the contract documents for advertisement. After the Project Plans Unit (PPU) has completed the redline changes to the electronic files, the final project plans will be available to be viewed on the web in TIFF format. The SE prepares a Quality Feedback and DCR memo to be sent back to the district Project Engineer along with the final Special Provisions.

> **Note**: if earthwork cross-sections were prepared for the project, they are required to be submitted to Construction in order to achieve Ready-to-List (RTL) status.

As-Awarded

After a project has been awarded to the winning bidder, DES-OE will send the District a "Second Notice," which instructs the District to copy the As-Awarded DGN files. These DGN files include any addenda that may have occurred during the advertisement of the project. All DGN files in DES-OE for a particular project will be deleted on the date listed in the "Second Notice." The District shall securely maintain the As-Awarded contract plans in case Construction needs any of the DGN files during the course of constructing the project.

The **As-Awarded** plans **MUST** be used when developing the As-Built plans at the completion of construction. The As-Awarded project plans are microfilmed and stored by the HQ Microfilm Unit. The original base maps or the PS&E submitted contract plans are **NOT** to be used when completing the As-Built plans.

It is the responsibility of each district to maintain accurate electronic archives for the PS&E plans, As-Awarded plans, base maps and As-built plans in order to preserve the cycle of re-utilizing electronic data for future projects.

AADD Projects

- AADD stands for "Authority to Advertise District Delegated."
- AADD projects are described as the Districts Delegation of Authority to Advertise Minor A, Maintenance and CTC-Delegated Projects less than $1 Million. District provides final contract plans, specifications and estimates for project advertisement.
- Contact the DES-OE AADD coordinator and the Project Plans Unit at DES-OE for complete guidance on completing AADD projects.
- All AADD projects should follow all Caltrans standards for preparing contract plans as described in the CADD Users Manual, Plans Preparation Manual and this EZ Guide.

Files to Surveys & Construction

The Division of Construction administers the contract that oversees the successful construction of a project. Depending on the scope of the project, the Office of Surveys may be involved when survey information is required to build the project.

For each project, the Project Engineer is required to send Construction the “Resident Engineer (RE) File Checklist.” For details on the RE File Checklist, see Appendix GG in the Project Development Procedures Manual.

If the Office of Surveys will be involved in the project, the Project Engineer is required to send the Office of Surveys the “Survey File Checklist.” For details on the Survey File Checklist, see Appendix GG in the Project Development Procedures Manual.

Contract Change Order

Changes to a contract may be necessary during the construction of any project. A change is made with a Contract Change Order (CCO). A CCO is a legally binding document used to make changes to the contract.

Construction is the lead in handling CCOs. Depending on the nature of the change, Construction will usually consult with or get concurrence from the Project Engineer when the change affects the design of the project. Any engineered design change usually requires the seal and signature of a professional engineer in responsible charge of each engineered design change. For a comprehensive look at how the CCO process works, see Chapter 5 of the Construction Manual.

If replacement or additional sheets are generated by the CCO, they must have the signature and seal of a registered engineer (whether the engineer be from Design or Construction) who is most responsible for the change. Before the As-Built plans can be completed, each replacement or additional project plan sheet must contain the signature and seal of a registered engineer.

As-Builts (Roadway Plans)

As-Built plans are the original (as-awarded) project plan sheets that have been updated showing changes that occurred during construction. Accurate As-warded and As-Built plans are needed for possible litigation involving construction claims and tort liability suits. As-Built plans represent the existing field conditions at the completion of a project, and may be used as reference or base mapping for future projects. All As-Built plans must be clearly identified as such. All plan sheets containing changes must have (at a minimum) the name of the Resident Engineer, the Construction Contract Acceptance (CCA) date, and the contract number.

The Resident Engineer can make the field changes to hard copy prints (afterwards transferred to the original As-Awarded project CADD files) or directly to the As-Awarded project CADD files themselves. For the final As-Built plans, revisions are noted by lining out the original information but it must still remain legible. Do not eradicate original figures or make corrections over them. All lettering must be legible. The changes shall be made in such a manner that they will produce good quality microfilm.

NOTE: All engineered design changes made during construction must be shown on the plans with a “cloud” around it in addition to the lining out of changed or superseded information. Changed contract plan sheets, with engineered design changes, **must** be signed and sealed by the professional engineer in responsible charge of each engineered design change.

For instructions on how to complete the As-Built changes in the As-Awarded project CADD DGN files, see Chapter 4 of the CADD Users Manual. The final As-Built changes shall be completed in the original As-Awarded project CADD DGN files on Level 62.

Consultant Prepared Projects

Consultant prepared projects must comply with the requirements set forth in the Plans Preparation Manual and CADD Users Manual. Consultants are to **adhere to the same requirements** as any Caltrans Project Engineer. This includes advance planning studies, preliminary design, PS&E submittals, support through the construction of the project and completion of the As-Built plans.

All consultant prepared projects are to be submitted to the district administering the oversight contract. The printed name, signature and registration number of the Design Oversight engineer shall appear on the contract plans as described in the Plans Preparation Manual Section 2, Figure 2-4. The districts are responsible for submitting a consultant project to DES-OE and then keeping the consultants informed on comments, reviews or questions from DES-OE.

Cooperative Agreements and Contract Agreements should state that the latest standards identified in the CADD Users Manual and Plans Preparation Manual **must** be followed for all final products (deliverables) throughout the Project Delivery Process.

Some typical requirements for submittal of project plans are:

- Files only accepted in MicroStation DGN format.
- Use Caltrans standardized English border sheets located in the Caltrans English cell library "**ctcellib.cel**."
- Compliance with all prescribed Caltrans text sizes and drafting conventions.
- Compliance with Caltrans leveling convention, colors, line weights, line codes and file naming convention.
- Conformity to Caltrans plotting standards and software.
- Conformity to Caltrans drafting conventions as described in the CADD Users Manual and this EZ Guide.
- Conformity to preparation of the contract plans as described in the Plans Preparation Manual.

Caltrans Website Resources for Consultants:

http://www.dot.ca.gov/hq/oppd/cadd/rsc_files/webpage.htm

Caltrans Contact Names

(This EZ Guide is dedicated to John Gizinos and Glen Boulware)

For further information on the
CADD Users Manual
Plans Preparation Manual
EZ Guide
or the preparing of contract plans
Contact: Jeff Kepley (916) 227-2572

For further information with
DES OE - Project Plans Unit
Contact: Lenard Hudnall (916) 227-6309

For further information on the
Standard Plans, Standard Specifications and Special Provisions
Contact: Santo Wong (916) 227-6231

For further information on the transition from Metric to English
Contact: Kevin Herritt (916) 653-0253

Additional Caltrans Websites

- For transition from Metric to English:

  http://www.dot.ca.gov/hq/oppd/metric/metricpg.htm

- For Standard Plans:

  http://www.dot.ca.gov/hq/esc/oe/project_plans/index.htm

- For the Ready To List Guide:

  http://www.dot.ca.gov/hq/esc/oe/specifications/rtl_guide/